

**Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1. (previously presented) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx, comprising:  
    injecting the hydrocarbon into the engine exhaust in accordance with detection of a light-off event, such light-off event being detected when there is a hydrocarbon-oxygen reaction wherein an exothermic reaction is produced and detected.
2. (cancelled)
3. (cancelled)
4. (currently amended) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:
  - (a) detecting an exothermic reaction across the catalyst;
  - (b) detecting a temperature of an output of the catalyst in response to the detected exothermic reaction; and
  - (c) injecting the hydrocarbon into the reaction in accordance with the detected temperature.
5. A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

- (a) detecting a pair of temperatures ~~temperature difference~~ across the catalyst to provide a temperature difference across such catalyst;
- (b) comparing the temperature difference with a predetermined temperature threshold;
- (c) determining an exothermic condition temperature ~~at an output of the catalyst~~ when the temperature difference is determined to exceed the threshold, such exothermic condition temperature being determined from one of the pair of detected temperatures;
- (d) comparing the determined exothermic condition temperature with an exothermic condition temperature expected from the catalyst at a time prior to the determined exothermic condition temperature; and
- (e) modifying the injected hydrocarbon in accordance with said last-mentioned comparison.

6. (currently amended) A method for determining peak efficiency temperature of a catalyst in reducing NOx wherein such NOx is reduced by reacting such NOx in the catalyst with a hydrocarbon, comprising:

- (a) detecting a pair of temperatures across the catalyst, such pair of temperatures providing ~~a~~ temperature difference across the catalyst;
- (b) comparing the temperature difference with a predetermined temperature threshold; and
- (c) determining an exothermic condition temperature ~~at an output of the catalyst~~ when the temperature difference is determined to exceed the threshold, such exothermic condition temperature being determined from one of the pair of detected temperatures.

7. (currently amended) A system for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

- (a) a catalyst for facilitating a reaction between the injected hydrocarbon and NO<sub>x</sub> in the exhaust;

(b) a hydrocarbon injector for injecting the hydrocarbon into the exhaust upstream of the catalyst;

(c) a detecting system comprising:

    a pair of sensors each detecting a common parameter in the exhaust, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor; and

    a processor for controlling the hydrocarbon injector in response to the pair of sensors, such processor being programmed to:

        compare a difference in the common parameter detected by the pair of sensors with a predetermined threshold;

        determine an exothermic condition temperature from one of the pair of sensors at an output of the catalyst when the difference in the common parameter is determined to exceed the threshold;

        compare the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

        modify the injected hydrocarbon in accordance with said last-mentioned comparison.

8. (previously presented) The system recited in claim 7 wherein the common parameter is temperature and wherein the sensors are temperature sensors.

9. (currently amended) A processor for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst to facilitate reaction between the injected hydrocarbon and the exhaust NOx, such processor being programmed to:

    provide a control signal to a hydrocarbon injector to inject the hydrocarbon into the exhaust upstream in response to output signal from a pair of sensors, each of the pair of sensors being adapted detecting a common parameter in the exhaust, one of such sensors being upstream of the catalyst and the other one of the sensors being

downstream of the first sensor, such control signal being provided by steps comprising:

comparing a difference in the common parameter detected by the pair of sensors with a predetermined threshold;

determining an exothermic condition temperature from one of the pair of sensors at an output of the catalyst when the difference in the common parameter is determined to exceed the threshold;

comparing the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

modifying the injected hydrocarbon in accordance with said last-mentioned comparing.

10. (currently amended) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

comparing a difference in a common parameter detected by a pair of sensors with a predetermined threshold, one of such sensors being upstream of the catalyst and the other one of the sensors being downstream of the first sensor;

determining an exothermic condition temperature from at least one of the pair of sensors at an output of the catalyst when the difference in the common parameter is determined to exceed the threshold;

comparing the determined exothermic condition temperature with an exothermic condition expected from the catalyst at a time prior to the determined exothermic condition temperature; and

modifying the injected hydrocarbon in accordance with said last-mentioned comparison.

11. (previously presented) The method recited in claim 10 wherein the common parameter is temperature and wherein the sensors are temperature sensors.

12. (currently amended) A method for controlling hydrocarbon injection into an engine exhaust to reduce NOx in such exhaust, such engine exhaust with the NOx and the injected hydrocarbon being directed to a catalyst for reaction therein, comprising:

- (a) detecting an exothermic reaction across the catalyst;
- (b) measuring a temperature of ~~of an output~~ of the catalyst in response to the detected exothermic reaction; and
- (c) injecting the hydrocarbon into the reaction in accordance with the measured temperature.

13 (currently amended) A method for determining peak efficiency temperature of a catalyst in reducing NOx wherein such NOx is reduced by reacting such NOx in the catalyst with a hydrocarbon, comprising:

- (a) detecting a pair of temperatures across the catalyst, such pair of temperatures providing a temperature difference across the catalyst;
- (b) comparing the temperature difference with a predetermined temperature threshold; and
- (c) determining a temperature ~~at an output~~ of the catalyst when the temperature difference is determined to exceed the threshold, such determined temperature being obtained from at least one of the detected temperatures.

14. (new) The method recited in claim 4 wherein the detected temperature is an upstream temperature.

15. (new) The method recited in claim 5 wherein the exothermic condition temperature is determined from an upstream one of the pair of detected temperatures.

16. (new) The method recited in claim 6 wherein the exothermic condition temperature is determined from an upstream one of the pair of detected temperatures.

17. (new) The system recited in claim 7 wherein the exothermic condition temperature is determined from an upstream one of the pair of sensors.

18. (new) The system recited in claim 9 wherein the exothermic condition temperature is determined from an upstream one of the pair of sensors.

19. (new) The method recited in claim 10 wherein the exothermic condition temperature is determined from an upstream one of the pair of sensors.